

### **REMARKS**

In response to the Office Action dated June 18, 2010 (hereinafter “the Office Action”), the Applicants respectfully request reconsideration. Claims 1-22 were previously pending in this application. By this amendment, claims 21 and 22 are amended. No claims are cancelled, and no claims are added. Support for the amended claims can be found throughout the specification including the drawings, and at least at FIG. 3, and page 10. No new matter has been added. As a result, claims 1-22 are pending for examination with claims 1 and 10 being independent claims.

#### **Rejections under 35 U.S.C. § 103**

Claims 1-22 stand rejected under 35 U.S.C. § 103(a) as purportedly being unpatentable over U.S. patent No. 4,894,302 to Hoffman *et al.* (hereinafter “Hoffman”) in view of U.S. patent publication No. 2002/0048706 to Mayes *et al.* (hereinafter “Mayes”) in further view of U.S. patent publication No. 2002/0122985 to Sato *et al.* (hereinafter “Sato”). The cited references have been reviewed, and the Applicants respectfully traverse the rejections for the reasons set forth below.

#### **Claim 1**

Claim 1 is generally directed to a rechargeable battery and recites, *inter alia* and in combination with other elements, “a first pole comprising ... a conductive material comprising a mixture of fine graphite powder and fine carbon powder, the fine carbon powder having particle diameters on the order of nanometers,” an “ionic conductor comprising an element belonging to 2A Group and/or 3B,” and “the active material has an average particle diameter as small as 1 nanometer, so that the active material exhibits battery reaction.” The Office Action (p. 3) combines Mayes and Sato with Hoffman to present a *prima facie* case of obviousness in rejecting claim 1. Applicants respectfully disagree.

Mayes and Sato, however, are not properly combinable, and further Mayes teaches away from Applicants’ invention as claimed in claim 1. Mayes discloses (paragraphs [0024]) that carbon black or graphite are used as electronically conductive particles in a cathode, but that the average particle size in the cathode is “typically on the order of no less than about 100 microns.” Mayes

also describes an embodiment (paragraph and [0071]) in which conductive particles are “in the 10 to 100 micron range,” and then later teaches (paragraph [0106]) that the ion host particles can be significantly (orders of magnitude) smaller than these values. Thus, Mayes teaches away from Sato, which teaches a smaller size range (10 nm to 10  $\mu$ m) for the conductive particles, and that the ion host particles are at least an order of magnitude larger than the conductive particles. (Sato, [0014], [0016], and [0054]) Therefore, Sato is not properly combinable with Mayes as a basis for setting forth a rejection of claim 1 under 35 U.S.C. § 103. (See MPEP 2145 X. D. 2. citing *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779, Fed. Cir. 1983.) For at least this reason, a rejection of claim 1 under 35 U.S.C. § 103 cannot be based on a combination of Mayes and Sato. Reconsideration and withdrawal of the rejection is respectfully requested.

Additionally, Mayes, considered alone, teaches away from Applicants' invention. Mayes teaches that the conductive particles are “in the 10 to 100 micron range” (paragraph [0071]), but this is orders of magnitude larger than values set forth in claim 1. One of ordinary skill in the art looking to Mayes at the time of the invention would not be led to “a conductive material ... having particle diameters on the order of nanometers.” For this additional reason, reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. § 103 is respectfully requested.

Further, because of the various possible combinations of cathode materials, anode materials, electrolytes, and their chemical constituents, demonstrating a working electrochemical device is typically difficult and unpredictable. Such evidence can be found in both Hoffman and Sato. Hoffman notes that one electrolyte/anode-cathode combination may work well in one embodiment, but be ineffective in another embodiment where the anode-cathode couple is changed. This can be due to electrolyte instability with the different anode-cathode couple. (Hoffman, Col. 1, lines 26-36) Sato discloses that “extensive efforts” were carried out just to obtain proper mixing of conductive and active materials of the cathode. (Sato, [0013]) Applicants also note that none of Hoffman, Mayes, or Sato demonstrate a rechargeable electrochemical device exhibiting “battery reaction” as set forth in claim 1 or dependent claim 21. Mayes is directed to Li-ion batteries and does not disclose battery characteristics for a device as claimed in claim 1 or 21. Sato provides no disclosure of battery operation. Hoffman (Col. 8, lines 37-44) discloses little data on device operation, but fails to disclose whether the device exhibited battery reaction or capacitive reaction, or provide

information about rechargeable characteristics. Thus, even if one were to combine Hoffman, Mayes, and Sato, a combination which Applicants deem improper, one of ordinary skill in the art would not have been able to predict whether the device as claimed in claim 1 would have exhibited battery characteristics or function at all. For example, it would not be predictable whether small conductive and active material particles would be stable in a cathode matrix or exhibit mobility or structural change over time that would adversely or beneficially affect the battery's performance. Since development of new electrochemical devices typically yield unpredictable results and none of Hoffman, Mayes, or Sato provides evidence of a functioning electrochemical device as claimed in claim 1, Applicants submit that claim 1 is non-obvious over Hoffman, Mayes, and Sato.

In view of the foregoing reasons, Applicants respectfully submit that claim 1 patentably distinguishes over Hoffman, Mayes and Sato. Reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. § 103(a) is respectfully requested.

Claims 2-9 and 21 depend from claim 1 and are therefore allowable for at least the same reasons.

#### Claim 10

Claim 10 is generally directed to a rechargeable battery and recites, *inter alia* and in combination with other elements, "a conductive material comprising a mixture of fine graphite powder and fine carbon powder, the fine carbon powder having particle diameters on the order of nanometers," and "the ionic conductor comprising an element belonging to 2A Group and/or 3B," and "the active material has an average particle diameter as small as 1 nanometer, so that the active material exhibits battery reaction." For reasons that should be clear from the above discussion relating to claim 1, claim 10 is also patentable over Hoffman, Mayes and Sato. Reconsideration and withdrawal of the rejection of claim 10 under 35 U.S.C. § 103(a) is respectfully requested.

Claims 11-20 and 22 depend from claim 10 and are therefore allowable for at least the same reasons.

Amended claims 21 and 22

Claim 21 depends from claim 1, and claim 22 depends from claim 10. Claims 21 and 22 have been amended to include, “constant voltage discharging occurs between 1 and 1.5 volts.” Neither Hoffman, Mayes, nor Sato disclose this limitation of claims 21 and 22, as the limitation is to be construed in combination with the elements of respective base claims 1 and 10. As noted above, Mayes is directed to Li-ion batteries and fails to disclose battery characteristics for an electrochemical device as set forth in claim 1 or 21. Sato provides no disclosure of battery operation. Hoffman (Col. 8, lines 37-44) discloses little data on device operation, but fails to disclose “constant voltage discharging occurs between 1 and 1.5 volts.” For at least this reason and the reasons set forth above relating to base claims 1 and 10, claims 21 and 22 patentably distinguish over Hoffman, Mayes, and Sato.

General Comments on Dependent Claims

Since each of the dependent claims depends from a base claim that is believed to be in condition for allowance, for the sake of brevity, the Applicants believe that it is unnecessary at this time to argue the further distinguishing features of the dependent claims. However, the Applicants do not necessarily concur with the interpretation of the previously presented dependent claims as set forth in the Office Action, nor do the Applicants concur that the basis for rejection of any of the previously presented dependent claims is proper. Therefore, the Applicants reserve the right to specifically address the further patentability of the dependent claims in the future.

**CONCLUSION**

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, the Director is hereby authorized to charge any deficiency or credit any overpayment in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 23/2825, under Docket No. S1459.70129US00.

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